JOURNAL

OF THE

AMERICAN CHEMICAL SOCIETY.

VOL. XII.—NO. 1.

JANUARY,

1890.

COMMITTEE ON PAPERS AND PUBLICATIONS:

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A. C. HALE,
A. A. BRENEMAN, Editor.

ABSTRACTORS:

W. RUPP, J. F. GEISLER,
W. P. MASON, F. T. KING.

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PUBLISHED MONTHLY

NEW YORK:
JOHN POLHEMUS,
102 Nassau Street.
1890.

The **Journal of the American Chemical Society** appears monthly, except during July and August. It will contain all papers read before the Society, as well as abstracts from American and Foreign Journals, and a list of American Patents relating to Chemical Industries.

The Price of Subscription is $5.00 per year, in advance.

The Meeting Room and Library of the Society are at Room 1, University Building, Washington Square, New York.

The Regular Monthly Meeting is held on the first Friday of every month, at 8 P. M.

Corresponding Secretary:

A. C. HALE, 356 Carlton Ave., Brooklyn, N. Y.

Treasurer:

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The Library will be open to Members regularly on Fridays, from 6 to 10 P. M., and at any other time on presenting to the Janitor of the University Building a ticket, which can be obtained of the Librarian.

Back numbers of the Journal are sold to Members at $3.00, to others at $5.00, per volume. Apply to the Librarian

WILLIAM RUPP, 117 Pearl St., New York.

The Committee on Papers and Publications respectfully call attention to the resolutions of the Society, requiring that papers be submitted to the Committee before being read.

Authors will be furnished, gratis, with 20 reprints of each article published in the Journal, if application for the same be made when the article is sent.

Members are requested to give notice of any change of address, or failure in the delivery of the Journal. All communications relating to the Journal should be addressed to the Editor.

A. A. BRENEMAN, 97 Water St., New York.

REGULAR MEETING, Jan. 3d, 1890.

The minutes of the annual meeting held Dec. 6, 1889, were read and adopted.

The following new members were unanimously elected: Mr. Otto P. Amend of Eimer & Amend, N. Y.; Dr. August Seher, 115 Chestnut St., Newark, N. J.; Lt. Willoughby Walke, Instructor in Chemistry, Artillery School, Fortress Munroe, Va.; Dr. Wm. L. Dudley, Prof. of Chemistry, Vanderbilt University, Nashville, Tenn.; Mr. Oscar Textor, Cleveland Rolling Mills, Cleveland, O.; Dr. Thomas B. Stillman, Prof. of Chemistry, Hoboken, Stevens Institute of Technology, N. J.

The following names were proposed for membership: Dr. Geo. F. Barker, Prof. of Physics, University of Pennsylvannia, Philadelphia, Pa.; Dr. Edward Hart, Prof. of Chemistry, Lafayette College, Easton, Pa.; Dr. J. T. McGill, Vanderbilt University, Nashville, Tenn.

The following papers were read by the authors: Analysis of Some Marine Oils, Russell W. Moore, A. M., M. Sc.* Comparative Results in the Analysis of Fats, by Russell W. Moore, A. M., M. Sc. On the Alleged Efficacy of Mine-water in Preventing the Infection of Rivers by Sewage, by Prof. A. A. Breneman; The Action of Nitrous Anhydride dissolved in carbon disulphide on different Organic Compounds, Dr. L. H. Friedberg.

A letter was read from Dr. H. B. Nason, thanking the Society for his election to the Presidency, and stating that owing to ill health he was about to leave home for the South.

The resignation of Mr. W. D. Horne was read and accepted.

The report of the Committee on Reorganization was then called for. Progress in the work of this Committee was reported by the Chair, the only member of the Committee present, and a motion was then made that this Committee be directed to continue its work and to make a final report at the February meeting. The motion was carried.

The meeting was then adjourned.

C. F. MCKENNA,
Recording Sec'y.

* The first two papers on the list will be found in the two preceding numbers of the Journal, November and December, 1889, respectively; they were published in advance of date because of previous delay in the issue of the Journal.—ED.

THE TREASURER'S STATEMENT FOR 1889, AMERICAN CHEMICAL SOCIETY.

Dr.	RECEIPTS.		PAYMENTS.	*Cr.*
1888.			1889.	
Dec. 31, To Balance on hand		$307 91	Dec. 31, By Cash Paid, On account of Journal	$695 42
1889.			" Editor's Expenses	5 86
Dec. 31, To Cash Rec'd from Members for Dues	$834 74		" Janitor's Fees	75 00
" Donations	210 00		" Rent	250 00
" Journal account	48 25		" General Expenses	12 49
			" Collector's Expenses	1 00
			" Librarian's Expenses	2 54
			" Secretary's Expenses	27 47
			" Treasurer's Expenses	25 02
			Balance on Hand	306 10
		$1,400 90		$1,400 90

December 31, 1889.

JAMES H. STEBBINS, JR., *Treas.*

ANNOUNCEMENT.

REVISION OF THE CONSTITUTION.

The Committee on Revision of the Constitution and By-laws of the American Chemical Society, appointed by the Board of Directors at the meeting held Jan. 7, 1890, ask the co-operation and assistance of members of the Society, and other chemists, in their work.

It is desired that the revised Constitution may be free from the objections that have been urged against the present Constitution, and that it may be the basis of a more general organization of American Chemists.

Suggestions as to changes in the present Constitution, or introduction of new sections, will be carefully considered by the Committee. It is expected that the report of the Committee will be ready for action by the Board of Directors by March 5th, and a printed copy of the revised Constitution will then be presented to every member of the Society to be voted upon.

Communications should be forwarded as soon as possible.

A copy of the present Constitution is mailed to each member with the present number of the JOURNAL.

All communications should be addressed to J. H. Stebbins, Jr. 114 Pearl street, New York.

Very respectfully,

J. H. STEBBINS, JR.,
L. H. FRIEDBURG,
J. F. GEISLER,
} Committee.

EDITORIAL.

The prospects of the American Chemical Society for the year 1890 seem brighter than for several years past, and there is reason to hope that the present number of the Journal may be the beginning of a volume that shall more worthily represent the original aims and purposes of the Society. The Journal must be, in any case, the measure and indicator of the scientific vigor of the Society; its function is primarily to chronicle the acts and doings of the Society; and without some basis of scientific work accomplished and to be reported, the journal of the Society has no *raison d'etre*. Abstracted and selected matter have a certain place in it, but not the first place. It would be easy to make of the journal a mere eclectic, bearing the name of a torpid organization and drawing its sustenance from the work of other societies, but this would not be fulfilling its purpose. How fully its proper function has been filled during the past four years it is not necessary to say. To say that it and the society which it represents have been kept alive mainly by local effort during that period is, perhaps, a doubtful comment upon the propriety of the existence of either, and the fact is only to be justified by the faith of those who believe that it is worth while to maintain the form and charter of an established national organization until events will enable it to make good its original purpose. The Journal has to thank its friends for such support as has been given it and to ask the renewed interest of those who have had only criticism to give where it might justly have expected coöperation.

The meeting of November 1st, 1889, was made the occasion of a general discussion of the affairs of the Society. The attendance was exceptionally large and the practical result of the meeting was the appointment of a committee to secure pledges of money and scientific material to permit of the regular issue of the journal. The improvement in the outlook of the Society for the present year is largely due to the work of this committee. A large number

of papers have been promised by members and the treasury has been replenished to such an extent that the dues of members for the year 1890, together with the funds now in hand, will amply provide for the expenses of the journal.

Apart from this, negotiations which have been in progress for some time have resulted in securing free rooms for the meetings of the Society and storage for its books, journals, etc., in the building of the University of the City of New York. The library will be placed, as a separate collection, in the library of the University, accessible at all times and under the eye of the librarian, who is always present. For working purposes the library will be more available under the new arrangement than it has been heretofore.

The revision of the Constitution of the Society has been under discussion for several months, and a committee has recently been appointed by the Board of Directors to prepare a report upon this subject. An announcement of this committee will be found in the present number of the journal. It is desirable that this revision should be thorough and that the new Constitution may be the basis of a reorganization of the Society that may enable it to meet more fully the needs of a national organization of chemists.

This brings us to the question which has been much under discussion during the past two years, namely, the best method of securing more thorough organization and coöperation among chemists in America.

The proposal to organize upon the basis of the American Chemical Society, while providing for local sections and for an annual meeting with the American Association for the Advancement of Science, has been debated and is still under discussion; undoubtedly it contains the true elements of the solution. The writer, however, speaking only for himself, would question the desirability of fixing the place of meeting at present. It would seem better to leave the decision to the Society at its annual meeting. The annual meetings should be held in different places successively in order to appeal more fully to that local feeling which is an element always to be considered; but it may well be ques-

tioned whether a constitutional provision linking the Society so closely to the American Association is desirable. The writer takes the liberty of modifying, somewhat, his views upon this question as expressed when the question was first broached. The matter has been under discussion at two successive meetings of the American Association and has failed there to secure decided support. Moreover, the number of chemists in attendance at these meetings has not been large enough of late to accurately represent the sentiment of the chemists throughout the country.

The time of the Association meeting, midsummer, is no more suitable, on the whole, for the majority of chemists than the Christmas holiday season would be, and an annual meeting in one of the large cities at that time would probably be an occasion of more interest and better work than one held in Summer. The experience and usage of such bodies as the National Academy and the Society of Mining Engineers are worthy of consideration upon this point. As the Chemical Society could probably have only one general meeting each year at first, it should give even more attention to the question of time and place than these societies, while adhering, like them, to the peripatetic principle.

As to the question of local *habitat* for a national society the writer believes that a place of deposit for books and papers, a meeting room and library and a place of general rendezvous would add to the dignity and efficiency of the organization. Such a place can only be found in one of the large cities, and New York, as the most populous centre and the gathering point of more than two hundred chemists, has the best claim to it. But, whatever may be the issue of the present discussion, the American Chemical Society may be counted upon to act in accordance with the best interests of chemistry and with the general opinion of American chemists, whenever a clear expression of such opinion can be obtained. In undertaking a radical revision of her constitution and asking the assistance of all chemists in the work, the Society is taking the course which, in the opinion of its members, will lead most directly to the solution of the whole question.

ON THE ACTION OF NITROUS ANHYDRIDE (NITROGEN TRIOXIDE), DISSOLVED IN CARBON DISULPHIDE, UPON DIFFERENT ORGANIC COMPOUNDS.

By L. H. Friedburg and John A. Mandel.

(*First Paper.*)

The action of free nitrous anhydride upon organic bodies capable of reacting with it, varies greatly and is generally productive of changes more profound than simple substitution. But if under the influence of this action substitution products are formed, these belong to the nitroso, or to the isonitroso, compounds. The formation of nitro products, however, in this manner is exceptional.

Thus, primary amines of the fatty series are changed into the corresponding hydroxyl derivatives, while secondary amines yield nitroso amines and tertiary amines are not acted upon. Amido bodies of the aromatic series are transformed into diazo compounds, while the imide group gives rise to nitroso derivatives.

Some investigators have found the action of nitrous anhydride to be oxydizing* upon hydrocarbons and substituting in the highest degree upon phenol† forming picric acid with the latter. An easily accessible reference for the general literature of this action of nitrous anhydride upon organic bodies is Beilstein's Handbuch der Organischen Chemie, 1886. (Vol. I., pp. 110 and 111.)

It has seemed to us that in lessening the violence of this reaction by the diluting influence of some third substance of indifferent behavior new results might be obtained. Other chemists have attempted in a general way to control the method and make it more readily available. Thus Stenhouse & Groves‡ used a solution of nitrous anhydride in conc. sulphuric acid to prepare nitrosophenol and Weselsky§ used common ether as a dilutent

* A. R. Leeds, J. Am. Chem. Soc., **2** (1880), 17.
† A. R. Leeds, J. Am. Chem. Soc., **2** (1880), 422.
‡ Ann. Chem. (Liebig), **188**, 354.
§ Ber. chem. Ges., **8**, 98.

for N_2O_3 in the preparation of diazophenol nitrate and mononitro phenols. About fifteen years ago, one of us, experimenting then on carbon disulphide, found this latter to be an excellent solvent for gases of very different character, and at that time * tried the action of nitrogen dioxide dissolved in CS_2 upon different bodies. The results not being of special interest, although they showed the possibility of obtaining substitution as well as addition products† in this way, the use of a solution of nitrous anhydride in carbon disulphide suggested itself as the next step. The results here submitted are to be regarded as preliminary only; the authors intend to pursue the investigation and to apply the reaction above mentioned in many different cases.

First as to the preparation of nitrous anhydride. Arsenious oxide (As_2O_3) in very fine powder is treated with c. p. nitric acid of 1.42 sp. gr. in a capacious flask provided with delivery tube and thistle tube with safety bulbs. The gas is slowly generated and passed through several U tubes filled with spirals and flat pieces of test lead so as to free the gas from all nitric acid. The receiver, from the start, is surrounded with a mixture of ice and salt, and the green liquid obtained is redistilled once from this receiver into a similar one which is put into the freezing mixture while the first is immersed in tepid water. Thus a clear, dark blue fluid is obtained and only traces of liquid nitric acid remain in the original receiver.

The N_2O_3 thus prepared is then gently poured into carbon disulphide, previously purified and freed from dissolved sulphur, by shaking it at intervals, for a day or more, with mercury. The mixture of CS_2 and N_2O_3 must also stand in the freezing mixture. This is the nitrous anhydride solution as we invariably use it. The body to be acted upon is likewise dissolved in CS_2 and kept in the cooling mixture. The nitrous anhydride solution is added to the solution to be treated very slowly, best in drops. The heat of the reaction is thus kept down as much as possible and the spontaneous evaporation of some of the CS_2 assists in the reduction of temperature. The organic substances which have thus

* Ber. d. chem. Ges., 8, 1616.

† J. Am. Chem. Soc., 4, 252, 1882.

far been submitted to the action of nitrous anhydride by the above methods are benzol, phenol and diphenylamine.

Benzol and Nitrous Anhydride.—The products under these conditions are exclusively mono-nitrobenzol and para-dinitrobenzol; the latter, which is formed in larger quantity, occurs in flat crystals, which after the first recrystallization melt at exactly 89° C. Under the conditions it could not be ascertained whether nitrous oxide was amongst the products of reaction; but if this be assumed, as it may be, according to the investigations of Leeds*, we may write as the equation for this reaction:

$C_6H_6+2N_2O_3=$ *para* $C_6H_4\ (NO_2)_2+H_2O+N_2O$, while for the formation of mononitrobenzol, which is obtained at the same time, the equation would be:

$2C_6H_6+2N_2O_3 = 2\ C_6H_5NO_2+H_2O+N_2O$. According to this equation two molecules of benzol must take part in the reaction, and, since an excess of nitrous anhydride was used, the predominance of the dinitro compound is explained.

Leeds (*loc. cit.*) working with undiluted nitrous anhydride obtained, in addition to mononitrobenzol, oxalic acid *with water of crystallization*, and the formation of this latter makes it more than likely that our reactions took place in the manner above suggested.

Phenol and Nitrous Anhydride.—In this case the results corresponded in part to those of Weselsky (*loc. cit.*) who used common ether as a diluting agent and obtained orthomono- and paramononitrophenol, but Weselsky obtained at the same time diazophenol nitrate, which precipitated; of this we did not obtain a trace, while nitrosophenol formed one third of the products in our experiment. Very small quantities of higher nitro compounds, which formed also, may, for the present, be neglected.

The greater part of the volatile orthonitrophenol remains dissolved in the carbon disulphide, while none of the paranitrophenol is dissolved. This solution is easily decanted from the underlying liquid which contains some ortho, and all of the para and nitroso compounds. The separation is effected by distillation in a

* J. Am. Chem. Soc. 2 (1880),426.

current of steam and the para compound is thus left in the retort, but portions of it, though not volatile, as well as some of the non-volatile nitroso compound are carried over into the distillate, which renders purification necessary. The distillate is shaken with ether. From this solution, which was not yellow but strongly dichroic between purple and green, olive green crystals of orthonitrophenol were obtained. These, when redissolved in water and distilled in a small fraction tube at gentle heat, yielded a crop of beautiful, straw yellow crystals of orthonitrophenol which melted at 45° C.

The remaining liquid in the fraction tube showed Liebermann's nitroso reaction and decomposed to black, powdery bodies as impure nitrosophenol does. The paranitrophenol was crystallized from its solution and, after frequent recrystallizations, was obtained in crystals an inch in length, showing the exact melting point of 114° C. The reaction offers us also two well defined equations. For the formation of the two isomeric mononitrophenols:

$$2C_6H_5OH+2N_2O_3=2C_6H_4NO_2OH+H_2O+N_2O;$$

and for the nitrosophenol,

$$2C_6H_5OH+N_2O_3=H_2O+2C_6H_4NO.OH;$$

$$\text{or } C_6H_4\begin{cases}O\\|\\N,\ OH.\end{cases}$$

Diphenylamine and Nitrous Anhydride.—This reaction was effected in three different ways:

I.—The diphenylamine was dissolved in absolute alcohol and the solution of nitrous anhydride in CS_2 was added. The alcohol not having been sufficient to keep all the carbon disulphide dissolved, enough was added to obtain a uniform solution.

II.—The diphenylamine as well as the nitrous anhydride were separately dissolved in CS_2 and the solutions were then mixed.

III.—Experiment II. was repeated with diphenylamine dissolved in CS_2 in which an equivalent amount of sulphur had previously been dissolved.

I. This experiment furnished after twelve hours an abundant quantity of light wax yellow needles a quarter of an inch long,

which had in crystallizing adhered to another compound forming small, brick-red, warty masses. The separation of these two compounds was based upon the lesser solubility of the red portions in ether and their greater solubility in benzol. Very small quantities of ether were added to the bulk of the mixture of crystals after they had been very thoroughly pressed between filter paper. Thus solutions were obtained which on crystallizing gave an abundance of the yellow and but few of the red crystals. Repeated, insufficient exhaustion of these with ether, gave us finally, perfectly pure, light amber colored, thick prisms, which were paramononitrodiphenylamine, melting at 133° C.

The red portions, also crystallized from ether (benzol was abandoned as a solvent, because the substance, as long as it was not quite pure, separated too slowly from this solvent) were subjected to sublimation and yielded a beautiful, scarlet red sublimate of very long needles, melting at 210° C., thus indicating that the compound was orthodinitrodiphenylamine. In one particular portion of the ethereal solution of the *para* compound, a large quantity of thick, hard, garnet-red crystals which appeared to be rhombic octahedra were obtained. Crushed in a mortar these crystals gave an orange-yellow powder, melting at 215° C., properties characteristic of paradinitrodiphenylamine.

II. and III. The carbon disulphide solution of diphenylamine, to which equivalent amounts of sulphur had been added, when mixed with solution of N_2O_3 in CS_2, yielded, on rapid evaporation, principally crystals of paramononitrodiphenylamine, melting at 133° C. When, before evaporation, absolute alcohol was added, the total amount of sulphur was precipitated. The sulphur had been added in order to see whether this element, which reacts so easily with diphenylamine, could not, simultaneously with the nitro-group, be incorporated into it.

In experiment I, the mother liquors were allowed to crystallize to the very last drop and thus, successively, mixtures of crystals were obtained which appeared progressively darker. The formation of nitroso compounds was suggested by the dark greenish coloration and the perceptibly acid odor of the latter portions.

We have made a number of varied qualitative experiments upon

other compounds of the aromatic series and intend soon to describe the action of N_2O_3 in CS_2 solution upon the aldehydes, acids and amido derivatives of the same.

College of the City of New York, January 3d, 1890.

ON THE ALLEGED STERILIZATION OF RIVER WATER BY MINE WATER.

By A. A. Breneman.

During an epidemic of typhoid fever which occurred in the city of Wilkesbarre, Pa., in the Summer of 1889, questions arose as to the purity of the different sources of water supply upon which the city depended, and the writer was called upon to make an examination of the waters in question. The water of the Susquehanna River is one of these and is the only one concerned in the present discussion. The history of the epidemic and its causes is not at present to the purpose.

It was found that the river water was preferred by the public and by local physicians to water from adjacent mountain streams in spite of the fact that it receives above Wilkesbarre the sewage of nearly 100,000 people in the course of ten miles, the city of Scranton, which discharges its sewage into the Susquehanna through a tributary, the Lackawanna, and of Pittston, which is directly on the river, being the principal sources of contamination.

This peculiar faith in the purity of a river so open to defilement is traceable in part to the general indifference to filth that is known to be largely diluted, but much more to the influence of certain articles published in the local papers with the stamp of official commendation and the authority of scientific or *quasi* scientific opinion.

It was believed by the people of Wilkesbarre that the river water was peculiarly free from possibility of transmitting infectious diseases because of the considerable quantities of mine water

which it receives, the mine water being supposed to exert a sterilizing effect through its well known constituents, free sulphuric acid and sulphates of iron.

As it seemed that this belief, which was supposed to rest upon a scientific basis, could best be upset by direct scientific tests, the writer proceeded to make the following examinations:

Samples of water were taken,

1. From the Susquehanna River at the intake of the Wilkesbarre Water Co.

2. From the mouth of the shaft of the Hollenbach coal mine, the drainage from which runs into the river above Wilkesbarre.

3. (For comparison only) From Mine No. 3 of A. Pardee & Co. (coal operators at Hazleton, Pa.), at a depth of 300 feet from the surface.

The above samples were examined chemically and biologically with the results given below.

CHEMICAL EXAMINATION.

	GRAINS PER U. S. GALLON.					
	Total Acid (SO_3).	Free Sulphuric Acid H_2SO_4	Ferric Oxide, Fe_2O_3.	Lime.	Magnesia.	Silica.
River	1.00	.00	.71	1.88*	.46†	----
Hol. Mine	51.16	15.59	12.23	8.21	4.09	2.50
Haz. Mine	127.30	20.85	65.40	2.55	4.27	2.70

The iron present in the mine waters was entirely peroxidized when received, and as it was contained in well corked bottles with very small vacant spaces above the liquid it had probably had little chance to change after bottling.

The river water was alkaline in reaction and contained no iron in solution; the portion present being suspended ferric oxide.

These qualitative data alone dispel the idea that the river water can retain at Wilkesbarre any of the germicidal power that may be possible to salts of iron or free sulphuric acid.

* Equivalent to 2.1 grains calcium carbonate or 1.7 grains calcium sulphate.

† Equivalent to 0.96 grains magnesium carbonate.

The mine waters are quite acid and the quantity of free acid irrespective of the ferric sulphate in solution (calculated from the ferric oxide present, although a portion of this had been precipitated when received), was sufficient to permit of some germicidal effect.

As the total sulphuric acid in the river water (all of which is combined) is onlyone grain per gallon, it is not possible to admit that any quantity of this acid that is relatively important can reach the river throughout its entire course of more than a hundred miles above Wilkesbarre, and as all of this acid, which has once entered the river, must remain in the water as soluble sulphates the inflow of the mine water must be quantitatively insignificant.

Bacteriological Examinations.

In view of the important part played by bacteriological evidence in such discussions as this, it seemed well to examine the above waters also for bacteria, and as a crucial test, to attempt the cultivation of the specific bacillus of typhoid fever in the water of the river after it had been sterilized by heat.

To this end new samples of the waters 1 and 2 were taken in sterilized bottles, with the necessary precautions, and submitted to Dr. Hermann Biggs, of Bellevue College Hospital, a well known specialist in bacteriology, for the necessary bacteriological examination.

The results of Dr. Biggs' examination showed that the sample of river water contained from 400 to 500 germs per c. c. of at least fourteen different species, six of these being of species that signify gelatine (putrefactive bacteria). When samples of this water was sterilized by discontinuous heating, inoculated with pure cultures of typhoid bacillus, allowed to stand for forty hours and then put into an incubator, the typhoid bacillus was found to be active at the end of forty-eight hours and apparently to have increased in numbers. The sole purpose of this experiment was to demonstrate, that there is not present in the river water any inorganic substance that can exert an inhibitive action upon the life or growth of the typhoid bacillus.

Further experiments showed also that the mine waters contained yeast and mould fungi, but no bacteria, although bacteria could

be developed in both by inoculation with appropriate cultures after sterilization, provided a small quantity of nutritive gelatine were added. As to the typhoid bacillus it was found that its growth (after treatment as in the case of mine water alone) was possible in No. 2 (Hollenbach mine water) but not in No. 3. As the proportion of free sulphuric acid is very slightly higher in No. 3 than in No. 2, the difference must apparently be ascribed to the much larger proportion of ferric salts in the Hazleton mine water.

In conclusion, it is evident that no effective sterilization of the water of any large stream can result from the small and varying contributions made to its volume by mine drainage since surface waters are certain to overpower any specific effect which the former might be capable of exerting, and the results of the foregoing examination render it unlikely that even mine waters of such strength as are commonly met with could, even undiluted, be of certain effect with germs having the high resisting power that the typhoid bacillus is known to possess.

It is certain, moreover, that a water rich enough in sulphuric acid or iron salts to act as a disinfectant would be entirely unsuited for drinking.

ABSTRACTS.

GENERAL CHEMISTRY.

Analysis of the Seed of Calycanthus Glaucus. H. M. WILEY.*

The above plant is a shrub growing in the mountains of the Southern States from North Carolina to Georgia. The berries, known locally as "bubby" berries, are violently poisonous, and

* See also a paper by L. E. Sterns on the Fruit of the Calycanthus (Bulletin of the Torrey Botanical Club, August, 1888,) and by R. G. Eccles, in Western Druggist, Jan., 1889, p. 15, and in Druggists' Circular, March 1889, p. 65.

being rich in sugar are apt to be eaten by cattle, and many cases of poisoning have resulted. The author has determined the composition of pod, hull and kernel of the fruit. The seed is very rich in oil, containing about 50 per cent. The oil is faint yellow of Sp. Gr. 9058 (extracted by solvents) to .9110 (expressed), contains no volatile acids, yields a fatty acid crystallizing at 12.5° and, judging by its iodine coefficient, the oil has moderate drying properties, which, however, were not further determined. The oil also contains a trace of the peculiar alkaloid "Calycanthine," which exists in the kernels in the proportion of 1.96 to 4.25 per cent. of the oil-free, dried kernels, the proportion depending upon the method of extraction. The hulls also contain the alkaloid to the extent of .83 per cent. Calycanthine yields the following colors with reagents : H_2SO_4, pale yellow ; HNO_3, bright green (persistent) ; H_2SO_4 and cane sugar, fine purple (persistent, but changing finally to blue) ; H_2SO_4 and K_2CrO_4, fine blood brick red. Analysis of calycanthine leads to the formula $C_{18}H_{40}O_{11}N_6$. (*Am. Chem. Jour.*, **11**, *1889, No. 7.*) A. A. B.

Influence of Food and Animal Idiosyncrasy on the Composition of Butter. H. W. WILEY.

An investigation of some peculiarities in composition of butter fat first noted at the Agricultural Experiment Station of Texas where the cattle were fed upon cotton seed meal. The volatile acids in such butter were found to be abnormally low, reaching 21.00 as compared with 28.50 for butter from cows fed on other feed. The cotton seed butter had the phenomenally high melting point of 45° C., yielded the iodine number 33.40, and exhibited strong reducing properties with silver nitrate. Experiments made with cows fed largely on cotton seed meal after feeding for a time on grass confirmed the above results only in the main. The experiments indicated, however, that cows fed only upon grass may yield butter so low in volatile acids, in exceptional cases, as to cast doubt upon the validity of the Reichert process, taken alone, as a means of deciding upon the character of butter. (*From a paper read before the Society for the Promotion of Agricultural Science, Toronto Meeting, Aug., 1889.*) A. A. B.

Determination of Mercury. W. Feit.

In alkaline solutions of mercury compounds arsenious acid precipitates metallic mercury on boiling, according to the equations :

$$2\,HgO + As_2O_3 = 2\,Hg + As_2O_5$$
$$2\,Hg_2O + As_2O_3 = 4\,Hg + As_2O_5$$

Upon these reactions the author bases the following method. If mixtures of mercurous and mercuric compounds are under examination, oxidize to mercuric salt by boiling with nitric acid. The removal of the latter is not necessary as it does not interfere in the final titration.

To the solution of the mercury salt add an excess of Na OH solution, and an excess of $\frac{n}{10}$ arsenious acid. Boil the liquid for 10–15 minutes, cool, dilute to definite volume, filter and take an aliquot part for titration with $\frac{n}{50}$ iodine solution. Neutralize the aliquot part taken with H Cl and make alkaline by addition of $Na\,HCO_3$, then titrate, using starch paste as an indicator. The quantity of arsenious acid actually required indicates the amount of mercury. (*Ztschr. anal. Chem.*, **28**, *pp. 318–322.*) J. F. G.

Determination of Thallium. W. Feit.

The author proposes a quick volumetric method depending upon the reaction between thallic salts and potassium iodide, in which the amount of liberated iodine indicates the quantity of thallium present, according to the equation :

$$Tl_2(SO_4)_3 + 6\,KI = 2\,TlI + 3\,K_2SO_4 + 4\,I.$$

It is essential that the thallium be present as thallic salt, preferably thallic sulphate, to effect which add to the thallium compound an excess of sulphuric acid, boil the solution and oxidize the same by adding bromine water. Continue the boiling to expel the excess of bromine. To the thallic solution thus obtained add an excess of KI, neutralize the free acid by adding an excess of $Na\,HCO_3$, then add an excess of $\frac{n}{10}$ arsenious acid solution. Allow the solution to stand for some minutes after repeated shaking until the precipitate has a pure yellow color. If the operation is performed in a graduated flask, fill up to the mark, allow the

precipitate to settle, decant or filter and take an aliquot part for titration with $\frac{n}{50}$ iodine solution from which calculate the amount of arsenious acid actually required for the free iodine of the first operation, which indicates the quantity of thallium present. In some cases thiosulphate may be used in place of the arsenious acid solution. (*Ztschr. anal. Chem.*, **28**, *314–316.*) J. F. G.

Incineration of Sugars and of Sirups without Sulphuric Acid. JEAN LUCIEN.

The author admits the utility of the method of incinerating sugars and syrups in a current of pure oxygen gas, but maintains that it is industrially impracticable when a large number of determinations have to be made in a comparatively short time. He has obtained absolutely concordant results in less time than when operating with the aid of sulphuric acid, by mixing with five grammes of sugar or three grammes of syrup, one per cent. of zinc oxide in the former case or two per cent. in the latter, and incinerating the mixture in a platinum capsule over a Bunsen's gas jet; subsequently calcining at the entrance of a muffle heated to dull redness. (*La Sucrené Indigène et Coloniale, from "Bulletin de l'Association des Chimistes," March, 1889.*)

F. T. K.

Abstracts of American Patents Relating to Chemistry.

(*From the U. S. Patent Office Gazette.*)

(*Issued January 7th, 1890.*)

418,675.—Direct-pointed adhesive negative. J. Baynes.

418,711.—Process of manufacturing gas. A. O. Granger.

The process consists in raising a body of carbonaceous material to a high degree of heat by burning it with air, and at the same time burning the gaseous products of combustion with air and highly heating a body of refractory material, then suspending the combustion and introducing directly into the coolest portion of the heated refractory material hydrocarbon liquid, causing it to pass through the refractory material in a direction the reverse of that in which the products of combustion passed through during the process of heating, then at the same time causing

steam to pass through the highly heated carbonaceous material and be decomposed into carbon monoxide and hydrogen, then causing such gas, as fast as it is generated, to pass through the refractory material in the same direction and in company with the hydrocarbon liquid, and thereby combine with the vapors and gases of the hydrocarbon as they are generated by contact of the oil with the refractory material at successively increasing temperatures.

418,719.—Filter or strainer. W. A. Hepburn.

418,761.—Apparatus for making salt. F. Siedentopf.

418,792.—Process of aging liquors. J. A. H. Hasbrouck.

The liquor is confined in a vessel lined with carbon, and subjected to the action of heat and oxygen while in a fine state of division.

418,801.—Apparatus for dyeing. J. H. Lorimer.

418,807.—Gas blowpipe. D. M. Monroe.

418,814.—Pharaoh's Serpent. C. Nelson.

418,864 —Apparatus for the production of oxygen. L. Chapman.

418,872.—Process of Pasteurization of beer. W. Kuhn.

418,916.—Blue dye. B. Homolka.

A blue violet coloring matter, formed from aniline, aniline hydrochloride and amido azo benzol. The formula is C_{24} H_{18} N_4.

418,947.—Crayon. A. Hart.

Consists of a pigment and carnauba wax, stearic acid and paraffin.

419,023.—Filter. C. V. Roberts.

419,098.—Apparatus for making oil gas. T. Alexander and S. Alexander.

419,106.—Paint composition. J. Bollinger.

Consists of ammonium chloride, quick lime, boiled oil, salt and water.

419,163.—Black pigment. A. G. Wass.

Consists of calcareous earthy substances, as chalk, impregnated with saccharine matter, and particularly the earthy refuse of sugar refineries, calcined or burned.

(*Issued January 14th, 1890.*)

419,195.—Process of separating solder from tinned iron. W. E. Harris.

The tinned iron is coated with petroleum, and the latter burned on the iron to melt off the solder, in a suitable receptacle.

419,215.—Apparatus for producing fresh water from sea water. W. F. Pamphlett.

419,224.—Extracting apparatus. T. Scully.

419,266.—Filter. E. M. Knight.

Consists of asbestos cloth or other fibrous material and an exterior coating of a filtering medium in the form of paste spread upon the cloth and an exterior cover of wire screen to uphold the medium.

419,274.—Process of manufacturing iron and steel alloys. H. Marbeau.

A malleable alloy, composed of iron or steel and nickel, the proportion of nickel being less than 25 per cent. of the whole, with manganse and aluminium.

419,331.—Process of scouring or dyeing. S. Hodgson.

419,332.—Alcoholic distillation. W. L. Horne.

419,347.—Process of purifying and deodorizing petroleum. R. M. Perrine.

The process consists in first agitating the petroleum with bleaching powder for five hours, more or less, then adding sulphuric acid to complete the elimination of the chlorine gas, and to neutralize and precipitate the alkaline matters and other impurities, and finally drawing off the purfied and deodorized oil.

419,350.—Apparatus for washing gases. M. A. Piedra.

419,404.—Process of manufacturing basic linings for converters. E. Bestrand.

419,533.—Stove polish. A. J. Miller.

Consists of alkali soap, water, plumbago, and oil of bitter almonds.

419,582.—Solution for preserving wood. J. P. Card.

Consists of 979 parts water, 20 parts zinc chloride, and 1 part mercuric chloride.

419,610. Process of recovering salt and crude glycerine from spent lye. E. K. Mitting.

The process consists in adding lime to the lye, removing the precipitate thus formed, concentrating the lye until it is saturated or nearly saturated with salt, then again treating with lime and again removing the precipitate, then boiling down the lye without further treatment to the finishing point, removing the salt thus produced either during or at the end of the operation, and finally purifying the salt by washing with a solution of common salt which has been rendered alkaline by the addition of a small percentage of caustic or carbonated alkali.

(*Issued January 21st, 1890.*)

419,655.—Manufacture of artificial stone. J. F. Gesner.

419,657.—Artificial solid material. J. F. Gesner.

419,671.—Foam for carbonated beverages. G. C. Henry.

Consists of infusion or tincture of sarsaparilla, etc., solution of gelatin, syrup, and water.

419,697.—Process of reclaiming rubber from waste rubber goods. N. C. Mitchell.

The process consists in grinding the stock into small fragments, attacking and disintegrating the fiber, removing the mud and similar impurities by washing in water, separating the heavier foreign substances by flooding in water, and floating the rubber away from such heavy substances by

the action of a current of water, devulcanizing by the action of live steam under pressure and disintegrating the devulcanizing mass.

419,707.—Preparation of malt. G. Reininghaus.

419,726.—Neutralizing sulphochlorinated organic compounds. A. Sommer.

Sulphochlorinated organic compounds containing hydrochloric acid, are neutralized by digesting the compounds with a volatile unsaturated hydrocarbon.

419,775.—Construction of filter presses. S. H. Johnson and C. C. Hutchinson.

419,779.—Process of treating glue and gelatin moulds. G. Koller.

The glue or gelatine is dissolved in an aqueous solution of an energetic oxidizing agent, then formed in molds and finally exposed to the action of light.

419,858.—Process of preserving wood. C. T. Lee.

The wood is immersed in a solution of resinate of glycerin and naphtha and then subjected to heat.

419,866.—Fuel block. A. K. Murray.

Consists of saw dust, a binder of clay and water, and a hardening mixture of plaster of Paris and water.

419,867.—Fuel composition. A. K. Murray.

Consists of about seven parts lignite and about one part coal dust, with sufficient clay and water to bring the mass to the consistency of soft putty.

419,868.—Fire kindler. A. K. Murray.

Consists of fibrous material, such as: waste paper, straw, shavings, sawdust, spent tan bark, etc., treated with a mixture clay, water, and saltpeter.

419,869.—Artificial fuel. A. K. Murray.

Consists of anthracite and bituminous coal dust, and sawdust, with a mixture of clay and water.

419,931.—Process of distilling mineral oils and like products. James Dewar.

Issued January 28th, 1890.

420,030.—Process of treating silver and zinc ores. F. L. Bartlett.

The process consists in mixing the ore with hydrocarbon fuel, supplying sufficient sulphur to produce an excess of the same, burning in the presence of an air blast forced uniformly up through the whole mass of ore and supplying air to unite with the products of combustion above said mass.

420,082.—Composition for paint. J. P. Moser.

Consists of tar, ammonium carbonate, lamp black, whiting, copal varnish, Japan drier, coal oil and tincture of ferric chloride.

420,130.—Flexible photographic film. W. H. Walker and George Eastman.

420,164.—Blue dye. J. Mohler.

420,311.—Nitroso dye. A. F. Poirriere.

Obtained by heating in a suitable medium, such as water, a salt of a nitroso derivative of a secondary or tertiary amine and separating the coloring matter from the solution by precipitation with a mineral salt.

420,315.—Process of cleaning wool. K. F. Stahl.

Woolen fibers are recovered from rags containing woolen and vegetable fibers by treating them with a heated solution of oxidized pickling liquor, unoxidized pickling liquor, brine and sulphuric or hydrochloric acid.

420,326.—Artificial stone composition. A. M. Blackmon.

Consists of salt, sand, alum, Portland cement, plaster of Paris, zinc chloride and boiled linseed oil.

420,371.—Method of burning cement making materials. J. M. Wilcox.

420,372.—Blue dye. O. M. Witt.

Is prepared by combining 1 molecule of the (so-called "Broenner's") betanaphthylamine, β-sulphonic acid with 1 molecule of β-naphtho-hydroquinone. The composition corresponds to the formula $C_{10}H_6$ (SO_3 Na)—N=N—$C_{10}H_5$ $(OH)_2$.

420,373.—Ammonium salt of β-naphthohydroquinone β-sulphonic acid. O. N. Witt.

Produced by submitting amido-naphthol-β-sulphonic acid to the successive action of oxidizing and reducing agents.

420,374.—Dark blue dye. O. N. Witt.

Results from the combination of 1 molecule of the so-called "Dahl's" α-naphthylaminedisulphonic acid with one molecule of β-naphtho-hydroquinone-β-sulphonic acid. The composition corresponds to the formula: $C_{10}H_5$ (SO_3 Na)—N=N—$C_{10}H_5$ $(OH)_2$.

420,394.—Process of making ozone water. C. F. W. Stelzer.

Hydrochloric acid or hydrochloric acid and a chloride in small quantity is added to ozone water to preserve its properties.

(Issued February 4th, 1890.)

420,428.—Process of filtering oil. C. F. Baker.

420,445.—Soluble nitrocellulose and process of manufacture. J. R. France.

Cotton is mechanically reduced to a uniform and homogeneous dust-like mass and subjected to the action of a bath of nitric and sulphuric acids.

420,446.—Insoluble nitrocellulose and preparing the same. J. R. France.

Cotton in a dust-like condition is subjected to the action of a bath of

nitric and sulphuric acids in the usual proportions and strength at a temperature of about 24° for about 15 minutes.

420,488.—Process of making soda alum. E. Augé.

A solution of sodium sulphate and aluminium sulphate is evaporated in vacuo at a temperature not exceeding 60°, and then cooled and crystallized.

420,515.—Apparatus for washing rubber stock. N. C. Mitchell and S. P. Sharples.

420,539.—Carbonizing steel. Charles Jones.

Ordinary steel is dipped into oil or grease, then into soot, and exposed to heat in contact with powdered carbon.

420,590.—Vulcanizer. C. A. Davis.

420,591.—Carbureter. W. Dawson.

420,598.—Alloy. E. Golay.

Consists of about 40 parts platinum, 35 parts copper, and 25 parts nickel.

420,615.—Compound for parchmentizing paper. Emery Andrews.

Consists of dilute sulphuric acid, hydrochloric acid, zinc and dextrin.

420,626.—Dynamite. Egbert Judson.

Consists of a base of nitrate or equivalent gas producing material, the grains and particles of which are protected by a paste, consisting of a cereal or leguminous powder combined with nitroglycerin.

420,642.—Solidifying colored fire. H. O. Frank.

Pyrotechnic powders are converted into solid form by adding a small quantity of alcohol to the powdered ingredients, and mixing the whole thoroughly together in a water bath at about 93° until the mass is in a soft pasty condition, and then while still warm pressing the mass into molds, previously coated with vaseline, or other analogous substance.

420,648.—Insulating compound. J. B. Williams.

Consists of India rubber, paraffin, a resinous body, sulphur, silica or its equivalent, and oituminous matter, which is solid when cold.

420,696.—Process of manufacturing transparent fabrics. L. L. Perry.

Consists in first passing bleached cloth or fabric through a size composed of starch, borax, water and lard, then drying the fabric, then passing it through a mixture composed of paraffin wax, dissolved in naphtha, boiled linseed oil mixed with benzine, linseed oil varnish mixed with turpentine and starch, and water, then drying, then moistening and subsequently calendering or glazing the fabric.

420,719.—Apparatus for subliming sulphur. C. Dubois.

420,749.—Evaporating apparatus. L. W. Tracy.

420,751.—Gas washer. W. T. Walker.

420,820.—Process of restoring rubber. N. C. Mitchell.

Rubber scraps are mixed with heavy oil and calcium sulphide, and subjected to the action of live steam.

420,821.—Apparatus for use in restoring rubber. N. C. Mitchell.

420,830.—Process of recovering glycerine from spent lyes. C. L. Porter.

The process consists in first treating the soap liquid with sulphuric acid, next passing superheated steam directly through the liquid, next adding lead oxide, then cooling and separating from the separated salts, then again passing steam through the liquid over direct fire, next adding charcoal or other carbonaceous matter, then adding lime, and finally, completing the process by separating the lye from the glycerine.

420,835.—Apparatus for recovering alkali. Geo. Seiler.

420,837.—Process of making chlorine. E. Solvay.

A mixture of a calcined silicious clay-like material and a chloride is filled into a decomposing apparatus. Then gas or combustible dust is introduced midway into the decomposing apparatus, producing combustion in the apparatus, and finally a current of air is introduced into the lower part of the apparatus.

420,877.—Apparatus for dyeing. W. D. Jones. W. R.